parts of the metal-containing layer that are redeposited to form residual sidewall passivation" is not described in the specification.

Page 6, lines 24 to 28, of the present application states,

> "A bias voltage is applied to a chuck that supports the substrate placing a potential across the wafer, thus electrostatically attracting plasma created from the etchant gas to the wafer (step 410). In the preferred embodiment the bias voltage is between -10 and -1,000 volts. More preferably the bias voltage is between -25 and -600 volts. Most preferably the bias voltage is between -50 and -400 volts."

Such electrostatically attracting the plasma accelerates the plasma toward the substrate. Page 7, lines 7 to 9, further states, "The plasma from the etchant gas bombards the surface of the wafer, etching away the parts of the metal-containing layer that are not below the etch mask." On page 7, lines 29 to 31, it states that the plasma is an oxygen plasma. For these reasons, claim 18 does not contain subject matter, which is not described in the specification.

The Examiner rejected claim 1 under 35 U.S.C. § 103 as being unpatentable over Hsieh et al. (US 5,776,832 hereinafter Hsieh) in view of Brown et al. (US 5,780,359 hereinafter Brown). The Examiner stated that Hsieh differs in failing to teach creating a plasma from the etch mask stripping gas in the etch chamber but that Brown teaches "the photoresist and residue are processed simultaneously by a chemical mechanism comprising a reactive species derived from a microwave-excited fluorine containing downstream gas, and a physical mechanism comprising ion bombardment that results from a radio frequency excited plasma and accompanying wafer self bias" quoting from the abstract of Brown and that it would have been obvious to modify Hsieh by using the method of Brown to create a plasma from the etch mask stripping gas for simultaneously removing photoresist and polymer residue from a wafer surface.

Neither Hsieh nor Brown teach flowing an etch mask stripping gas into the etch chamber and then creating a plasma from the etch mask stripping gas in the etch chamber as recited in claim 1. The Examiner stated that Hsieh fails to teach creating a plasma from the etch mask stripping gas. In addition, the Examiner cites the section of Brown that cites that the plasma is a downstream plasma. Downstream plasmas are plasma generated outside of the chamber and then provided to the chamber downstream. Since the plasma is created outside of the chamber and then provided to the chamber downstream, a plasma not an etch mask stripping gas is flowed into the chamber. Downstream plasma generators provide plasmas of a different power than in-

situ plasma generators. Since neither Hsieh nor Brown teach flowing an etch mask stripping gas into the etch chamber and then creating a plasma from the etch mask stripping gas in the etch chamber, claim 1 is not made obvious by Hsieh in view of Brown.

In addition, it would not be obvious to combine the teaching of Hsieh with Brown to obtain the invention, as recited in claim 1. Brown teaches a down stream plasma stripping device. It would not be obvious to combine the downstream plasma stripping device of Brown with the etch chamber of Hsieh, which uses an in-situ plasma. *Ex parte Clapp* (227 USPQ 972) states that "To support the conclusion that the claimed combination is directed to obvious subject matter, either the references must expressly or impliedly suggest the claimed combination or the examiner must present a convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of the reference." The Examiner has failed to point out parts of the cited references that expressly or impliedly suggest the combining of a downstream plasma device for stripping as described in Brown with the in-situ etching device of Hsieh, as required by *Ex parte Clapp*. In addition, *In re Vaeck* (20 USPQ2nd 1438) states that "Where claimed subject matter has been rejected as obvious in view of a combination of prior art references, a proper analysis under § 103 requires, inter alia, consideration of two factors: (1) whether the prior art would have suggested to those of ordinary skill in the art that they should make the claimed composition or device, or carry out the claimed process; and (2) whether the prior art would also have revealed that in so making or carrying out, those of ordinary skill would have reasonable expectation of success." The Examiner has not pointed out anything in any of the references that suggests that combining a downstream plasma source of Brown with the etching device of Hsieh would be successful in etching and stripping, as required by *In re Vaeck*. For at least these reasons, claim 1 is not made obvious by Hsieh in view of Brown.

Claims 2-14 and 17-18 each depend either directly or indirectly from independent claim 1, and are therefore respectfully submitted to be patentable over the art of record for at least the reasons set forth above with respect to claim 1. Additionally, these dependent claims require additional elements that when taken in the context of the claimed invention, further patentably distinguish the art of record. For example, claim 4 recites that the stripping away the etch mask and removing residual sidewall passivation further removes residue from walls of the etch chamber, which the Examiner failed to point out in any of the cited reference, such as Hsieh, Brown, Fukuyama and Tepman. Claim 14 recites that the step of electrostatically attracting

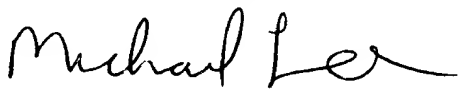
plasma from the etch mask stripping gas comprises the step of biasing the chuck supporting the substrate to a bias power between –10 and –1000 volts, such a DC voltage is not disclosed by the cited references, which instead teach using an RF for self biasing.

The Examiner rejected claim 15 under 35 U.S.C. § 102 as being anticipated by Hsieh. Hsieh does not teach the step of stripping away the etch mask and removing some residual sidewall passivation, while the substrate is in the etch chamber, as recited in claim 15. The Examiner stated that it is noted that a photoresist is removed by conventional resist stripping techniques such as by O_2 ashing, and that hence Hsieh's O_2 ashing step is the same as the applicant's stripping step. The oxygen based ashing described in Hsieh to remove polymer sidewalls would not be successful in removing inorganic sidewalls, since Hsieh does not use a bias voltage during ashing. Metal sidewall polymer is a polymer deposited on the sidewall of the metal layer; it is not redeposited metal. The residual sidewall passivation recited in claim 15 is formed from redeposited parts of the metal containing layer and therefore is made of an inorganic material. The ashing step in Hsieh is only for removing photoresist polymer, not for removing inorganic metal redeposited to form sidewall passivation, as recited in claim 15. Nothing in Hsieh discloses removing some of the inorganic metal redeposited to form sidewalls during the stripping step. For at least this reason, claim 15 is not anticipated by Hsieh.

Applicant believes that all pending claims are allowable and respectfully requests a Notice of Allowance for this application from the Examiner. Should the Examiner believe that a telephone conference would expedite the prosecution of this application, the undersigned can be reached at (831) 655-2300.

If any fees are due in connection with the filing of this Amendment, the Commissioner is authorized to deduct such fees from the undersigned's Deposit Account No. 50-0388 (Order No. LAM1P133).

Respectfully submitted,
BEYER WEAVER & THOMAS, LLP



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CLEAN VERSION OF PENDING CLAIMS

1. A method for etching at least partially through a metal-containing layer disposed above a substrate, wherein part of said metal-containing layer is disposed below an etch mask and part of said metal-containing layer is not disposed below the etch mask, comprising the steps of:

placing the substrate in an etch chamber;

flowing an etchant gas into the etch chamber;

creating a plasma from the etchant gas in the etch chamber;

etching away parts of the metal-containing layer not disposed below the etch mask, wherein some of the etched away parts of the metal-containing layer is redeposited to form residual sidewall passivation while the substrate is in the etch chamber;

discontinuing the flow of the etchant gas into the etch chamber;

flowing an etch mask stripping gas into the etch chamber;

creating a plasma from the etch mask stripping gas in the etch chamber;

stripping away the etch mask and removing some residual sidewall passivation, while the substrate is in the etch chamber; and

removing the substrate from the etch chamber.

2. The method, as recited in claim 1, further comprising the steps of:

electrostatically attracting the plasma from the etchant gas to the substrate in the etch chamber; and

electrostatically attracting the plasma from the etch mask stripping gas to the substrate in the etch chamber.

3. The method, as recited in claim 2, wherein the etch chamber is a metal etch chamber.

4. The method, as recited in claim 3, wherein the step of stripping away the etch mask and removing residual sidewall passivation further removes residue from walls of the etch chamber.

5. The method, as recited in claim 4, wherein the etch mask stripping gas comprises oxygen.

6. The method, as recited in claim 5, further comprising the steps of:

placing the substrate in a load lock; and

removing the substrate from the load lock to place the substrate into the etch chamber.

7. The method, as recited in claim 6, further comprising the steps of:

placing the substrate into a corrosion passivation chamber after the substrate has been removed from the etch chamber; and

exposing the wafer to a non-plasma high temperature water vapor.

8. The method, as recited in claim 7, further comprising the steps of:

transferring the substrate from the corrosion passivation chamber to a cooling station;

cooling the substrate in the cooling station; and

transferring the substrate from the cooling station to the load lock.

9. The method, as recited in claim 8, further comprising the step of maintaining a pressure between 1 and 80 millitorr during the etching and stripping steps.

10. The method, as recited in claim 9, further comprising the step of maintaining the substrate at a temperature between 10° and 100° C during the etching and stripping steps.

11. The method, as recited in claim 10, wherein the step of electrostatically attracting the plasma from the etchant gas comprises the step of biasing a chuck supporting the substrate to a bias power between –10 and –1,000 volts, and wherein the step of electrostatically attracting the plasma from the etch mask stripping gas comprises the step of biasing the chuck supporting the substrate to a bias power between –10 and –1,000 volts.

12. The method, as recited in claim 4, further comprising the step of maintaining a pressure between 1 and 80 millitorr during the etching and stripping steps.

13. The method, as recited in claim 12, further comprising the step of maintaining the substrate at a temperature between 10° and 100° C during the etching and stripping steps.

14. The method, as recited in claim 13, wherein the step of electrostatically attracting the plasma from the etchant gas comprises the step of biasing a chuck supporting the substrate to a bias power between –10 and –1,000 volts and wherein the step of electrostatically attracting the plasma from the etch mask stripping gas comprises the step of biasing the chuck supporting the substrate to a bias power between –10 and –1,000 volts.

15. A method for etching at least partially through a metal-containing layer disposed above a substrate, wherein part of said metal-containing layer is disposed below an etch mask and part of said metal-containing layer is not disposed below the etch mask, comprising the steps of:

placing the substrate in the etch chamber;

etching away parts of the metal-containing layer not disposed below the etch mask, wherein some of the etched away parts of the metal-containing layer is redeposited to form residual sidewall passivation on the substrate, while the substrate is in the etch chamber;

stripping away the etch mask and removing some sidewall passivation while the substrate is in the etch chamber; and

removing the substrate from the etch chamber.

16. An apparatus for etching at least partially through a metal-containing layer disposed above a substrate, wherein part of said metal-containing layer is disposed below an etch mask and part of said metal-containing layer is not disposed below the etch mask, comprising:

means for placing the substrate in an etch chamber;

means for flowing an etchant gas into the etch chamber;

means for creating a plasma from the etchant gas in the etch chamber;

means for etching away parts of the metal-containing layer not disposed below the etch mask, wherein some of the etched away parts of the metal-containing layer are redeposited to form residual sidewall passivation while the substrate is in the etch chamber;

means for discontinuing the flow of the etchant gas into the etch chamber;

means for flowing an etch mask stripping gas into the etch chamber;

means for creating a plasma from the etch mask stripping gas in the etch chamber;

means for stripping away the etch mask and removing some residual sidewall passivation, while the substrate is in the etch chamber; and

means for removing the substrate from the etch chamber.

17. The method, as recited in claim 1, wherein the stripping away comprises removing parts of the metal-containing layer that are redeposited to form residual sidewall passivation.

18. The method, as recited in claim 1, wherein the stripping away comprises accelerating oxygen plasma to the substrate to remove parts of the metal-containing layer that are redeposited to form residual sidewall passivation.